APPENDIX 2

Relative Risk and Attributable Risk in Cross-Sectional Studies

If two groups are identified that differ in both outcome (e.g., having or not having a disease) and concurrent exposure (e.g., living in a particular county or not), the study is "cross-sectional." For these computations, data take the same form as described in Appendix 1, and the fraction diseased within time t with rate m operative is approximated by the exponential model, $f = 1 - \exp(-mt)$. Then

$$RR = \frac{f_1}{f_0} = \frac{1-\exp(-m_1 t)}{1-\exp(-m_0 t)},$$

where t is the length of the period of study, m_1 is the estimated rate in the exposed group; and m_0 is the estimated rate in the comparison group. With $e = u/N$, again

$$AR = \frac{e\,(RR-1)}{e\,(RR-1)+1}$$

The data and computations for County A in Example 2 are as follows:

		Outcome		
		Disease X	**Not Disease X**	**Mid-year Population**
Exposure	County A	140	991	1,131
	Not County A	23,781	226,065	249,846
	Total	23,921	227,056	250,977

$m_1 = 140/1{,}131$, $m_0 = 23{,}781/249{,}846$, $t = 1$ (year), and

$$RR = \frac{1-\exp(-0.1238)}{1-\exp(-0.0952)} = \frac{1-.8836}{1-.9092} = 1.28$$

Now, $e = 1{,}131/250{,}977 = .0045$ so that

$$AR = \frac{(.0045)(1.28-1)}{(.0045)(1.28-1)+1} = .0013 \text{ or } .13\%$$

When the rates are small, the approximation of relative risk is simply the ratio of the rates, i.e., $RR = m_1 / m_0$, following a linearized Taylor series approximation of the exponential function. Here, $\frac{140/1131}{23{,}787/249{,}846} = 1.30$, quite close to 1.28.